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ABSTRACT

Interactive video, a combination of computer-assisted instruction and video technology, is an important new development in instructional media. Because interactive video has its roots in individualized instruction, it is particulary useful in personalizing instruction by allowing students to proceed at their own pace (one of the tenets of programmed instruction) and to receive immediate feedback (an advantage made possible by the advent of computer-assisted instruction). Two main types of video technology are available: videotapes and videodiscs. Despite their higher cost, videodiscs overcome many of the drawbacks of videotapes, including slow access time, poor freeze-frame characteristics, and costly maintenance. Because video technology is fairly new, few programs are available. For this reason, teachers and trainers desiring to develop interactive video instructional materials will require training in the five-step process of instructional systems design (ISD): analysis, design, development, implementation, and evaluation. A research project conducted at the Ontario Institute for Studies in Education illustrated the successful use of ISD in developing interactive video materials to train machine lathe operators. Other examples of interactive video in training include those produced and used by General Motors, IBM, and the American Heart Association. (MN)

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# OVERVIEW

ERIC® DIGEST NO. 51

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## INTERACTIVE VIDEO IN VOCATIONAL EDUCATION

Interactive video, a combination of computer-assisted instruction and video technology, is an important new development in instructional media. Interactive video is helping to change the delivery of technical training; students can experiment and test their skills through simulations and can gain additional training time without using expensive or dangerous equipment (Herschbach 1984).

This technology is particularly useful in personalizing instruction by allowing learners to proceed at their own pace and receive immediate feedback. The teacher is provided with continuous information on student performance as well. The concept of interactive video has its roots in individualized instruction.

### Delivering Individualized Instruction

Individualized instruction focuses on the efficient delivery of knowledge and skills based upon the learner's characteristics and needs. Among the methods of personalized instruction are the following:

- **Programmed Instruction.** In this method, students progress at their own rate using workbooks, textbooks, or electromechanical devices that provide information in discrete steps, test learning at each step, and provide immediate feedback about responses. Advantages include organization of knowledge into manageable frames, active responding, knowledge of results, and branching.
- **Computer-assisted Instruction (CAI).** Incorporating the advantages of programmed instruction, CAI uses the capabilities of the computer to control the rate of progress and the amount and type of instructional and test material each student uses. The computer can also generate instructional materials, student progress reports, and analyses of course effectiveness. Among the many forms of CAI are testing, drill and practice, tutorial, dialogue, simulation, and games.

CAI is usually more effective when it is enhanced with graphics. However, the storage requirements of graphics are beyond the capacity of many personal computers, so a different medium, such as videotape or videodisc technology, is needed.

### Types of Video Technology

Video technology extends the visual and audio attributes of CAI. The two major types of interactive video systems are tape and disc. Tapes are more easily produced and, unlike discs, do not require broadcast-quality video equipment or mastering at an external facility. Their disadvantages include slow access time, poor freeze-frame characteristics, and costly maintenance in a high-use, multiple unit environment. These drawbacks may be overcome by using videodiscs.

The most common form of this technology is the optical reflective videodisc—a shiny 12-inch disc read by a low-powered laser beam. The constant angular velocity (CAV) format can store 54,000 frames on each side with 1 frame per revolution. The disc frames can be accessed singly or by continuous playing. When played continuously, the disc stores 30 minutes of video per side and 30 minutes of audio on each of 2 audio tracks per side.

The basic configuration for learner interaction with video features an interactive video station into which learners enter responses and from which they receive information. Computer programs provide text, graphics, and an operating system. Typical variations include the following:

- In a two-screen interactive video station, learners read text on a monitor connected to a microcomputer and video and graphics on a monitor connected to a videodisc player.
- The single-screen version allows videodisc information to be placed on the screen simultaneously with microcomputer-generated text and graphics.
- A less-expensive version without an external microcomputer can only use prerecorded, unalterable disc information. The learner's responses are typically limited to multiple-choice or true-false answers entered with a numeric keypad or keyboard.

The various configurations dictate the type and method of input: keypad or keyboard, touch screen, light pen, mouse, joystick, optical character reader, or microphone.

### Five Phases of Interactive Video Design

Because video technology is fairly new, there are few programs available. Teachers and trainers intending to develop their own video materials should follow a systematic process of instructional systems design (ISD). ISD has five phases:

- **Analysis.** This step includes assessing needs and reviewing current methods of instruction, defining goals, analyzing tasks, and organizing and sequencing learning behaviors.
- **Design.** In this phase, learning activities are specified and media (e.g., printed text and alphanumeric and graphics computer displays) are selected.
- **Development.** The use of storyboards allows for successive review and revision before expensive production is begun at this point in the process.
- **Implementation.** This step includes selecting field sites, determining facility and equipment needs, and training instructional staff.
- **Evaluation.** Techniques may include pretesting, computer analysis of performance data, and postintructional interviews and tests.

In each phase, the skills of a team of individuals are needed: subject-matter experts, writers, text and graphics designers, television producers, programmers, and project managers.

### Producing Interactive Video Materials

In developing interactive video materials, the storyboard is used as a guideline for the production of graphics, video,

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audio, computer text, and computer programs. A storyboard is a panel or sheet depicting consecutively each scene or frame in a video program. The storyboard gives the technical specifications about length of the sequence, what will actually appear on the screen, what the learner's response will cause the program to do next, types and colors of graphics and text, transition to the next frame, coordination with narration, and so forth. In other words, storyboards give a great amount of detail about the way each frame of the video will actually look.

Storyboards are used to produce the shooting script and the narration script, and they are especially useful in the editing process. A typical videodisc might require more than 1,000 pages of storyboards, but such extensive preplanning can keep the costs of a production reasonable.

### Using Interactive Video in Instruction

Implementation is equally as important as design and production. Preparing an interactive video training site requires consideration of both the technology and the school or training facility in which it is to be used. Following are some of the physical factors to be considered when planning an interactive video training site:

- Is all the necessary equipment available? Is there enough space in the room for the work stations and traffic flow?
- Is there sufficient lighting? Will the lighting cause glare on the screen?
- Is the electrical capacity of the site adequate (sufficient amperage, enough outlets, surge and line noise protection)? Are connector cables compatible with video and audio components and electrical outlets?
- Does each work station provide adequate space for all components, a comfortable place for the learner, and access to necessary controls? With multiple units in one location, will noise be a problem?

A key element is an adequately trained staff. Instructors need to understand how the program operates and how it will enhance learning. The new system should be integrated with other elements of the curriculum. Management personnel must deal with the scheduling problems inherent in individualized instruction as well as with the use of the management information provided by the system. Plans for formative and/or summative evaluation and procedures for data collection should be formulated.

### Case Study: Machine Lathe Operations

A research project conducted at the Ontario Institute for Studies in Education (Olivier and Scott 1982, 1983) illustrates the application of interactive video design in vocational education. One of the project objectives was the production of a videodisc on machine lathe operations; the principles of ISD were followed in its design.

- **Analysis.** Researchers consulted with a shop teacher (the subject-matter expert) to analyze the tasks and behaviors involved in machine lathe operations.
- **Design.** A list of prerequisite skills, concepts and procedures to be learned, and measures of achievement was formulated and validated.
- **Development.** Detailed storyboards were created. Graphics and animations using CAN-8 software were produced. Text to be stored on the videodisc was input and edited. In the machine shop, video sequences illustrating lathe operations were shot, and a final master tape combining video, narration, text, and graphics was assembled.
- **Implementation.** The classroom site was prepared with special equipment installations. Shop teachers tested the program from the learner's viewpoint. In field trials, pretests, posttests, attitude questionnaires, and retention tests were administered to students using the video work stations. Later, the teacher rated student performance in operating the lathe.
- **Evaluation.** The computer management system provided detailed information on student and course performance. The results of achievement testing were very positive (average pretest and posttest scores were 41 and 92 percent respectively). More than 90 percent of the students had positive attitudes about the learning experience.

### Other Examples of Interactive Video in Training

The following organizations are using video for instruction:

- General Motors has produced discs on sales, new products, and mechanic training (Scott 1982).
- IBM uses videodiscs to train customers in small business computer operations ("How IBM Uses Videodiscs for Customer Training" 1983).
- The American Heart Association teaches cardiopulmonary resuscitation via a total system that includes videodisc and sensor-equipped mannequin (Hon 1982).
- National Education Corporation/ICS—Intext Division of Westport, Connecticut, has produced vocational curricula in electronics (17 videodiscs, 8 workbooks, and a 98-booklet reference set) and robotics (4 discs and 3 workbooks).

## REFERENCES

This ERIC Digest is based on the following publication:


Olivier, W. P. *Videodiscs in Voc Ed.* Information Series no. 299. $4.75. Columbus: ERIC Clearinghouse on Adult, Career, and Vocational Education, The National Center for Research in Vocational Education, The Ohio State University, 1985. (ERIC Document Reproduction Service No. ED 260 301).


### Additional References


Herschbach, D. R. *Addressing Vocational Training and Retraining through Educational Technology.* Information Series no. 276. $5.75. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1984. (ERIC Document Reproduction Service No. ED 241 747).

Hon, D. "Interactive Training in Cardiopulmonary Resuscitation." *Byte* 7 (June 1982): 108-138.

"How IBM Uses Videodiscs for Customer Training." *Educational and Industrial Television* 13 (March 1981): 31.

Olivier, W. P., and Scott, G. F. *Phase II Final Report: To Develop an Interactive, Computer-Based Optical-Videodisc Delivery System for Skill Training.* Report prepared for the Ontario Ministry of Education, Toronto, Canada, 1982.

———. *Phase III Final Report: To Develop an Interactive, Computer-Based Optical-Videodisc Delivery System for Skill Training.* Report prepared for the Ontario Ministry of Education, Toronto, Canada, 1983.

Scott, R. K. "GM and the Videodisc: Partners in Training." *Training and Development Journal* 36 (November 1982): 109-110.


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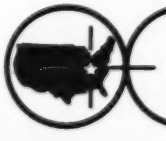


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